Effectiveness of Different Airway Clearance Techniques in Patients with Cystic Fibrosis: A Systematic Review

AUTHORS: Elmarakby, Ashraf¹; Burke, Kendra¹; Cashman, Cecilee¹; Day, Kaitlyn¹; DelMedico, Jessica ¹; Houshower, Catherine¹


Purpose/Hypothesis: The purpose of this review is to evaluate the evidence behind different airway clearance techniques in terms of their ability to effectively remove airway secretions, improve pulmonary function, sputum production/weight, patient satisfaction, and adherence in patients with cystic fibrosis.

Number of Subjects: Systematic Review of RCTs

Materials/Methods: Studies that were published in English language and from 2000 to 2015. Only randomized controlled trials and randomized crossover trials were included. The article search was conducted using the following key words: Cystic fibrosis and High frequency chest compression (HFCC), Positive expiratory pressure devices (PEP), Airway oscillating devices, Mechanical percussion (MP), Several databases were searched including CINAHL, Medline, Cochrane collaboration, PEDro, and PUBMED. The quality of included articles was assessed according to the PEDro scale.

Results: A total of 393 articles were found. Upon screening and evaluation, only six articles qualified for inclusion. In these articles, there was a total of 422 participants. The age ranges of the participants were five or older, with no maximum age limit. Five articles scored 8/10 on the PEDro scale and the other scored a 6/10. As for pulmonary function tests, all studies except for McIlwaine et al. (2013), showed no statistically significant improvement in pulmonary functions after utilizing different airway clearance techniques. The authors attributed this decline to the progression and pathophysiology of CF. For secretion removal, it was found that all techniques were successful in the removal of sputum; however, none reported statistically significant differences between the techniques. Regarding patient satisfaction, the flutter device was rated highest in convenience over PD&P and HFCWO and the PD&P was found to be substantially lower in patient satisfaction when compared to HFCWO (Sontag et al., 2010). Another study suggested that more participants were satisfied with PEP than HFCC (Fainardi et al., 2011). Finally, patient adherence was found to be high for the participant using HFCWO and PEP (McIlwaine et al., 2013) and also for acapella treatment (West et al., 2010).

Conclusions: Airway clearance techniques are effective in removal of secretions in...
patients with CF. The reviewed articles were of high quality and scored well on the PEDro scale; however there were not enough evidence to provide a conclusive decision that one secretion removal method is superior to another. More research with the use of longitudinal RCT designs that compare the efficacy of different airway clearance techniques should be performed.

**Clinical Relevance:** Pulmonary rehabilitation team is encouraged to use different airway clearance techniques to help minimize secretion accumulation and possible subsequent infections in patients with CF. However, there is no preference, thus far, regarding which technique is more effective than the other. Patients’ preference might be an important factor to consider while choosing between different airway clearances techniques.